

CLAIMS

What is claimed is:

- 1 1. A photodetector amplifier circuit comprising:
- 2 a photodetector;
- 3 an input transistor connected to the photodetector;
- 4 an integration capacitor connected to an output of the input transistor;
- 5 and
- 6 an adaptive skimming circuit connected to the integration capacitor.
- 1 2. The circuit of Claim 1, wherein the adaptive skimming circuit comprises:
- 2 a current source transistor;
- 3 a programming capacitor connected to the current source transistor;
- 4 and
- 5 a programming transistor connected to the current source transistor and
- 6 the programming capacitor.
- 1 3. The circuit of Claim 2, wherein the adaptive skimming circuit further
- 2 comprises:
- 3 a cascode transistor connected to the current source transistor and the
- 4 input transistor; and
- 5 a reset transistor connected to the input transistor.
- 1 4. The circuit of Claim 3, wherein the adaptive skimming circuit comprises a
- 2 kTC-noise reducing capacitor connected between the programming transistor and the
- 3 programming capacitor.
- 1 5. The circuit of Claim 4, wherein the adaptive skimming circuit further
- 2 comprises a trim capacitor connected to the current source transistor, the
- 3 programming capacitor, and the programming transistor.

1 6. The circuit of Claim 5, further comprising an external voltage transistor
2 connected to the programming transistor.

1 7. The circuit of Claim 6, further comprising a source follower transistor
2 connected to the output of the input transistor.

1 8. The circuit of Claim 6, further comprising an access transistor connected
2 between the input transistor and a bus.

1 9. The circuit of Claim 8, further comprising an external capacitor connected
2 to the bus.

1 10. The circuit of Claim 5, further comprising a negative feedback amplifier
2 connected between the photodetector and the input transistor, wherein the
3 photodetector is a low impedance detector.

1 11. A pixel cell comprising:

2 an input transistor;

3 a photodetector coupled to the source of the input transistor;

4 an integration capacitor for storing a charge proportional to an amount
5 of incident light on the photodetector; and

6 an adaptive skipping circuit comprising:

7 a current source transistor connected across the integration
8 capacitor;

9 a cascode transistor connected to the current source transistor
10 and the input transistor;

11 a reset transistor connected to the input transistor;

12 a programming capacitor connected to the current source
13 transistor; and

14 a programming transistor connected to the current source
15 transistor;

16 wherein a current source provided by the current source transistor sinks a set
17 level of current during integration of a charge on the integration capacitor.

1 12. The pixel cell of Claim 11, wherein the adaptive skimming circuit further
2 comprises a trim capacitor.

1 13. The pixel cell of Claim 12, wherein the adaptive skimming circuit further
2 comprises a kTC-noise reducing capacitor connected between the programming
3 transistor and the programming capacitor.

1 14. The pixel cell of Claim 13, further comprising an external voltage
2 transistor connected to the programming transistor.

1 15. The pixel cell of Claim 14, further comprising a source follower transistor
2 connected to the output of the input transistor.

1 16. The pixel cell of Claim 14, further comprising an access transistor
2 connected between the input transistor and a bus.

1 17. The pixel cell of Claim 16, further comprising an external capacitor
2 connected to the bus.

1 18. The pixel cell of Claim 14, further comprising a negative feedback
2 amplifier connected between the photodetector and the input transistor, wherein the
3 photodetector is a low impedance detector.

1 19. A focal plane array (FPA) having a plurality of pixel cells, each pixel cell
2 comprising:

3 an input transistor;

4 a photodetector coupled to the source of the input transistor;

5 an integration capacitor for storing a charge proportional to an amount
6 of incident light on the photodetector; and

7 an adaptive skimming circuit comprising:

8 a current source transistor connected across the integration
9 capacitor;

10 a cascode transistor connected to the current source transistor
11 and the input transistor;

12 a reset transistor connected to the input transistor;

13 a programming capacitor connected to the current source
14 transistor;

15 a programming transistor connected to the current source
16 transistor;

17 a trim capacitor connected to the programming transistor; and

18 a kTC-noise reducing capacitor connected between the
19 programming transistor and the programming capacitor;

20 wherein a current source provided by the current source transistor skims off
21 current during integration on the integration capacitor.

1 20. A method for skimming current in an amplifier circuit, the method
2 comprising:

3 generating a signal proportional to an amount of light incident on a
4 photodetector;

5 producing a sink current; and

6 reading out a signal that is proportional to the difference between the
7 generated signal and the sink current.

1 21. The method of Claim 20, wherein producing a sink current comprises:

2 setting a gate voltage of a skimming transistor by applying an enabling
3 pulse to a programming transistor that produces a replicating current in the skimming
4 transistor; and

5 applying a trimming voltage to a trimming capacitor.

1 22. The method of Claim 20, wherein further comprising storing the generated
2 current into a capacitor, and reading out the signal from the capacitor, such that the
3 sink current sinks a set level of a signal read out from the capacitor.

1 23. An amplifier circuit for coupling infrared (IR) detectors to multiplexing
2 readouts, the circuit comprising:

3 detector means for converting incident light to an input electric signal;

4 signal input means for transferring the input electric signal from the
5 detector means;

6 storage means for storing a charge from the detector; and

7 skimming means for skimming off a predetermined level of the input
8 electrical signal;

9 wherein the skimming means produces a sink current to skim off a
10 signal read out from the storage means.

1 24. An amplifier circuit for coupling infrared (IR) detectors to multiplexing
2 readouts, the circuit comprising:

3 an input transistor;

4 a detector coupled to a source of the input transistor;

5 a current source transistor having a drain connected to a drain of the
6 input transistor;

7 an integration capacitor connected between the drain and a source of
8 the current source transistor;

9 a programming capacitor connected between a gate and the source of
10 the current source transistor;

11 a programming transistor having a drain connected to the drain of the
12 current source transistor, and a source connected to the source of the current source
13 transistor;

14 a trim capacitor connected to the source of the programming transistor
15 and the gate of the current source transistor;

16 a kTC-noise reducing capacitor connected between the source of the
17 programming transistor and the gate of the current source transistor.

1 25. The circuit of Claim 24, further comprising:

2 a reset transistor having a drain connected to the drain of the input
3 transistor; and

4 a cascode transistor having a drain connected to the drain of the input
5 transistor, and a source connected to a drain of the current source transistor.

1 26. The circuit of Claim 25, further comprising an external voltage transistor
2 having a drain connected to the source of the programming transistor, and a source
3 connected to an external voltage.

1 27. The circuit of Claim 26, further comprising a source follower transistor
2 having a source connected to the drain of the input transistor.

1 28. The circuit of Claim 27, wherein the integration capacitor and the
2 programming capacitor are formed from MOSFETs.